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HYPSOCRINUS, A NEW GENUS OF CRINOIDS FROM THE DEVONIAN.

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HYPSOCRINUS, A NEW GENUS OF CRINOIDS FROM THE DEVONIAN.

BY FRANK SPRINGER AND ARTHUR W. SLOCOM.

Among the fossils collected by the junior author from the Hamilton shales, at Bethany, New York, was a Crinoid, which was found in the railway cut about one and one half miles west of the station of East Bethany. This locality is more fully described in another paper.* As this Crinoid, a single specimen of which was found, did not seem referable to any known genus, it was submitted to the senior author for his opinion, and as a result of his examination, it was deemed advisable to describe and illustrate it under our joint names. A very pronounced asymmetry, marked by a very unequal gibbosity at one side, induced at first the suspicion that the specimen might be abnormal. But it was found on examination to be in a remarkably fine state of preservation, the surface being in perfect condition, free from matrix, so as to show all its characters most clearly, without any artificial cleaning. Every suture was distinct and well marked, so there could be no doubt of the exact arrangement of the calyx plates. This being so, the question arose, if it is an abnormal specimen, to what species or genus does it, or might it, belong? No answer could be found to this question, and we have therefore concluded that the only proper course is to propose a new genus for its reception. The specimen is unique, nothing at all approaching it having ever been found, to the knowledge of the authors, in the Hamilton collections that have been made at various localities in this country, or in equivalent rocks in Europe. We hope that collectors will be on the look-out for it hereafter, and that if other specimens should come to light, we may be informed of the fact.

HYPSOCRINUS gen. nov.

(ὕψι, high, κρίνον, lily.)

An inadunate, monocyclic Crinoid, with two or more compound radials. Basals five. Radials five, of which the right posterior,

* Field Columbian Museum Publication, Geological series, Vol. II, p. 258.

right anterior, and perhaps anterior, are compound, — the first two bisected transversely, and the last, if at all, obliquely. No anal plate in the dorsal cup, but the lower segment of the right posterior radial probably is the radianal. Radial facets shallow, concave, filling the greater part, but not all, of the distal face of the radials. Arms simple, non-pinnulate. Tegmen unknown.

This genus belongs to a little group of irregular, Inadunate Crinoids, represented by *Pisocrinus* in the Silurian, and *Triacrinus*, *Haplocrinus* and *Calycanthocrinus* in the Devonian, having a monocyclic base, and one or more compound radials divided by transverse bisection. They belong to the group called Larviformia by Wachsmuth and Springer, Larvata by Jaekel, and Monocyclica Inadunata by Bather. Our genus differs from *Pisocrinus*, *Triacrinus*, and *Haplocrinus* in the character of the radial facets, which, instead of occupying a small, squarely mortised socket in the middle of the plate, are broad, shallow, and fill a large part of the distal face of the radial. This alone, and there are others beside, is a good generic distinction. *Calycanthocrinus* has somewhat similar radial facets, but represents a modification on another line, having several small supplementary arm-bearing radials in addition to the regular five, perhaps produced by a vertical bisection at the corners of the larger radials.

The genus *Phimocrinus* Schultze, from the Devonian of the Eifel, and elsewhere in Europe, is perhaps the one with which the most interesting comparison may be made. It is of similar elevated form, with five elongate basals, and five elongate, arm-bearing radials, which, as defined by Schultze, are regular in form.* The genus has been classed with the Symbathocrinidæ. In 1882, M. D. Oehlert† described and figured from the Lower Devonian of Sable, Department of La Sarthe, a new species, *Phimocrinus jouberti*, having the regular five basals, and five equal radials of the genus. But in the description the author states that he observed, on the two radials to the right of the anal side, and the second radial to the left of it, (i. e., the r. post., r. ant., and l. ant. RR), and at about two thirds of their height, a light and very distinct transverse groove, dividing these plates into two unequal parts; and he expresses the opinion that this groove marks the ankylosis of two pieces which were separate in the young stage. These transverse marks are faintly shown on Oehlert's figures (Pl. VIII, Fig. 1, 1a, 1b); but there are in the collection of the senior author, two speci-

* Mon. Echin. d. Eifler. Kalks., p. 29.

† Bull. Soc. Geol. de France, 3me ser. t. X, p. 353.

mens of this species, from the same locality as Oehlert's, which show them very plainly, not as actual sutures, but rather as lines of anchylosis. So it is evidently a constant character. The transverse bisection of the radials by the sutures represented by these lines would produce compound radials in the same rays in which they occur in *Haplocrinus*, *Heterocrinus*, and similar forms. This species, therefore, represents a form which in its younger stage would have fallen into the same group of irregular crinoids as our genus, but in which, by growth during life, the compound radials were eliminated, and the Crinoid modified into a regular form. *Phimocrinus* has straight radial facets, filling the entire distal face of the radials, and the arms articulate on a linear hinge line.

HYPSOCRINUS FIELDI sp. nov. Pl. LXXXI, Figs. 1-6.

Calyx elongate, cylindrical, slightly expanding to the arm bases. Base truncate; basal facet broad, slightly concave, entirely filled by the column; axial canal stellate or pentagonal, interrarial in position. Basals very elongate, forming two-fifths to half the height of the cup. Radials, three large and two small, all arm-bearing; the two smaller ones short, wider than high, separated from the basals by three much more elongate infer-radials, one of which is directly beneath the right posterior radial, and represents the radial; the other two are for the most part directly under the right anterior radial, whose lower margin meets them by an obtuse angle, but in part obliquely under the left lower corner of the anterior radial, meeting it by a curved suture; the other three radials are large and elongate plates. Arm facets very shallow, curved, not entirely filling the distal face of the radials, but leaving short, sloping shoulders between, which are rounded off exteriorly, but probably formed a support for oral plates in the tegmen. Arms simple, uniserial, tapering rapidly, and doubtless very short. No trace of a dorsal canal in radials or brachials. Anal structures and tegmen unknown. Surface smooth; calyx plates slightly rounded, and sutures distinct. Stem unknown; but it was large at the proximal end, as the radiate markings of its articulation are visible to the edge of the basal facet.

Horizon and Locality: Devonian; Hamilton group. Found near East Bethany, New York.

The specific name is in memory of Marshall Field, the founder of the Field Columbian Museum, where the type specimen is deposited.

Remarks. In the foregoing description we have found it necessary to guard against the insertion of some details, which are appar-

ent enough in the figures, but which may possibly be due to individual variation, or abnormal development. The form and distribution of the compound radials differ from those observed in any of the other genera of this group in the presence of two large plates underneath the superior part of one radial, so that we have apparently three infer-radials, with only two super-radials. The space occupied by one of these in the calyx wall is enough to account for the lateral bulging which gives its unsymmetrical form. Having but the one specimen, we cannot tell whether this feature is constant or not, and the specific and generic definitions do not depend upon it. As asymmetry is a frequent character in this group, however, there is no inherent improbability that the same construction will be seen in other specimens, if such are found. We give for comparison diagrams of *Pisocrinus* and *Haplocrinus*, the two genera nearest related to this structurally, (Pl. LXXXI, Figs. 7 and 8).

Pisocrinus has two short super-radials, which rest upon one large infer-radial in common. *Haplocrinus* has three short super-radials each with its corresponding infer-radial. Our crinoid has two short super-radials, one connected by a transverse suture with its infer-radial, while the other is angular below, and meets the upper sloping faces of the two infer-radials. If now we examine the diagram of *Haplocrinus* (Fig. 8) we will see that the right anterior super-radial is angular below, and meets by one side an upper sloping face of the infer-radial below it, and by the other a corresponding sloping face of the anterior radial, which is one of the two largest plates in the calyx. If a portion of this anterior radial were cut off by a curving suture, as indicated by the dotted line in the diagram, it would give a construction substantially the same as that of our genus in this respect, viz: two short super-radials supported by three infer-radials. In view of the other pronounced differences in the composition of the calyx, such a modification of the radial structure of *Haplocrinus* may well have become constant in our form.

A few of the arm plates have fallen in over the summit of the cup, and are thus preserved. They are restored to position in the diagram (Fig. 6). The first brachial of the left posterior ray is wanting, but its position is indicated by dotted lines. It will be observed that the right posterior radial has a smaller facet, and bears a smaller arm than the others. It is probable that the arms were very short, with but few more brachials than remain in the right anterior ray.

We cannot be absolutely certain that the orientation of the calyx here given is correct, as we do not know the position of the anus. It agrees with what we know of the relative positions of the com-

pound radials in *Pisocrinus* and *Haplocrinus*, and we see no reason for thinking any other arrangement preferable. A peculiar fact, which we have also omitted from the specific description, is that the posterior basal is much larger than any of the others, and is enlarged in such a way as to be actually radial in position, instead of inter-radial, as basals normally are.

We have not been able to ascertain anything of the construction of the tegmen. We attempted to remove some of the overlying brachial plates for that purpose, but they were found to be so firmly cemented by pressure, that the only result was fracture of these plates along the cleavage planes of the calcite, without revealing the structures underneath. The tegmen is clearly not an elevated pyramid like that of *Haplocrinus*, but beyond this, no opinion can be ventured with our present knowledge.

EXPLANATION OF PLATE LXXXI.

Hypoclinus fuscus, n. sp.

- Fig. 1. Lateral view of calyx, from right posterior ray.
2. Same, from right anterior ray.
3. Same, from anterior ray.
4. Same, from left anterior ray.
5. Same, from left posterior ray.

In these figures the remains of the brachial plates are seen lying upon the summit of the calyx in an apparently confused mass, but they are mostly in their proper relative positions, and can with reasonable certainty be restored. All figures

×5.

Diagrammatic view of calyx plates, with brachials arranged in natural order; the first brachial of the left posterior ray is missing, but is restored in dotted lines. The rays are numbered from the right posterior toward the right, and for convenience of comparison, these numbers, — as well as a series of numbers for the basals, — are carried into the accompanying figures.

7. Diagram of calyx of *Pisotrinus* (after Bather).

8. Diagram of calyx of *Hypoclinus* (after Bather).

(Explanation of lettering on figures: RA=radial; RS=super-radial; RI=inter-radial; PB=posterior basal; X=anal plate.)



EXPLANATION OF PLATE LXXXI.

HYPSOCRINUS FIELDI, n. sp.

Fig. 1. Lateral view of calyx, from right posterior ray.

" 2. Same, from right anterior ray.

" 3. Same, from anterior ray.

" 4. Same, from left anterior ray.

" 5. Same, from left posterior ray.

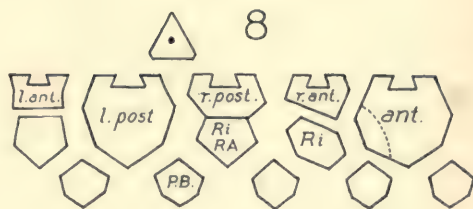
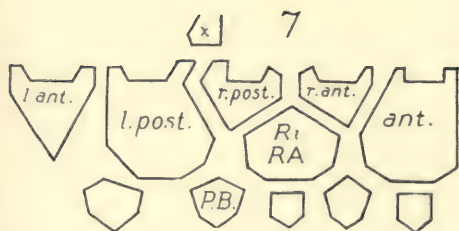
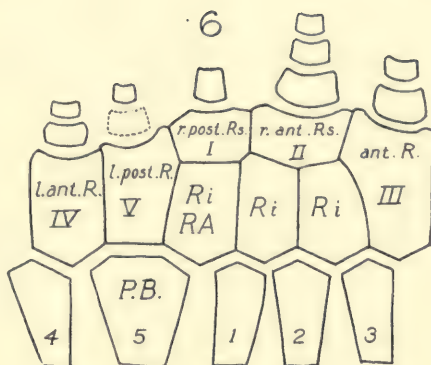
In these figures the remains of the brachial plates are seen lying upon the summit of the calyx in an apparently confused mass, but they are mostly in their proper relative positions, and can with reasonable certainty be restored. All figures $\times \frac{5}{2}$.

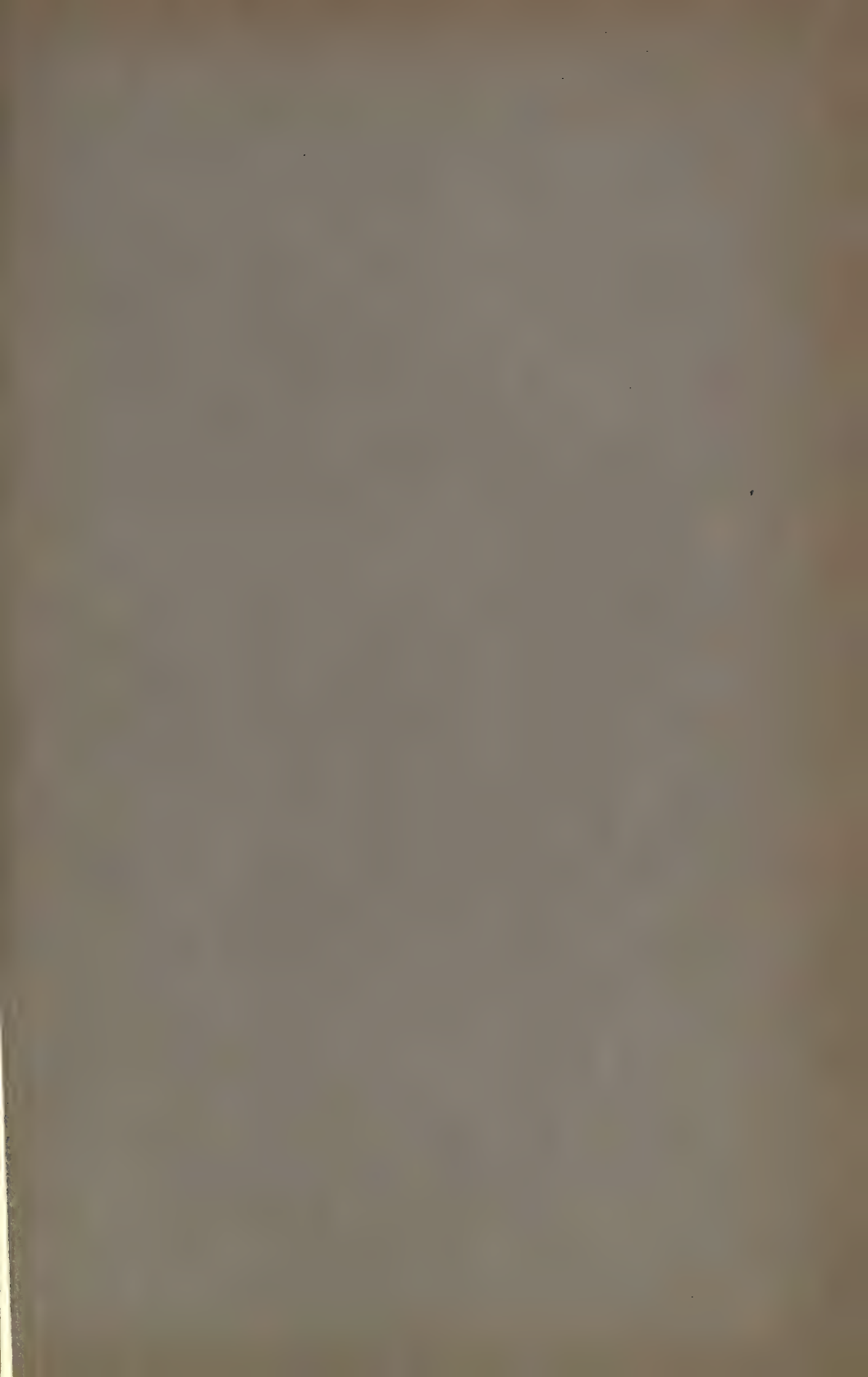
" 6. Diagrammatic view of calyx plates, with brachials arranged in natural order; the first brachial of the left posterior ray is missing, but is restored in dotted lines. The rays are numbered from the right posterior toward the right, and for convenience of comparison, these numbers, — as well as a series of numbers for the basals, — are carried into the accompanying figures.

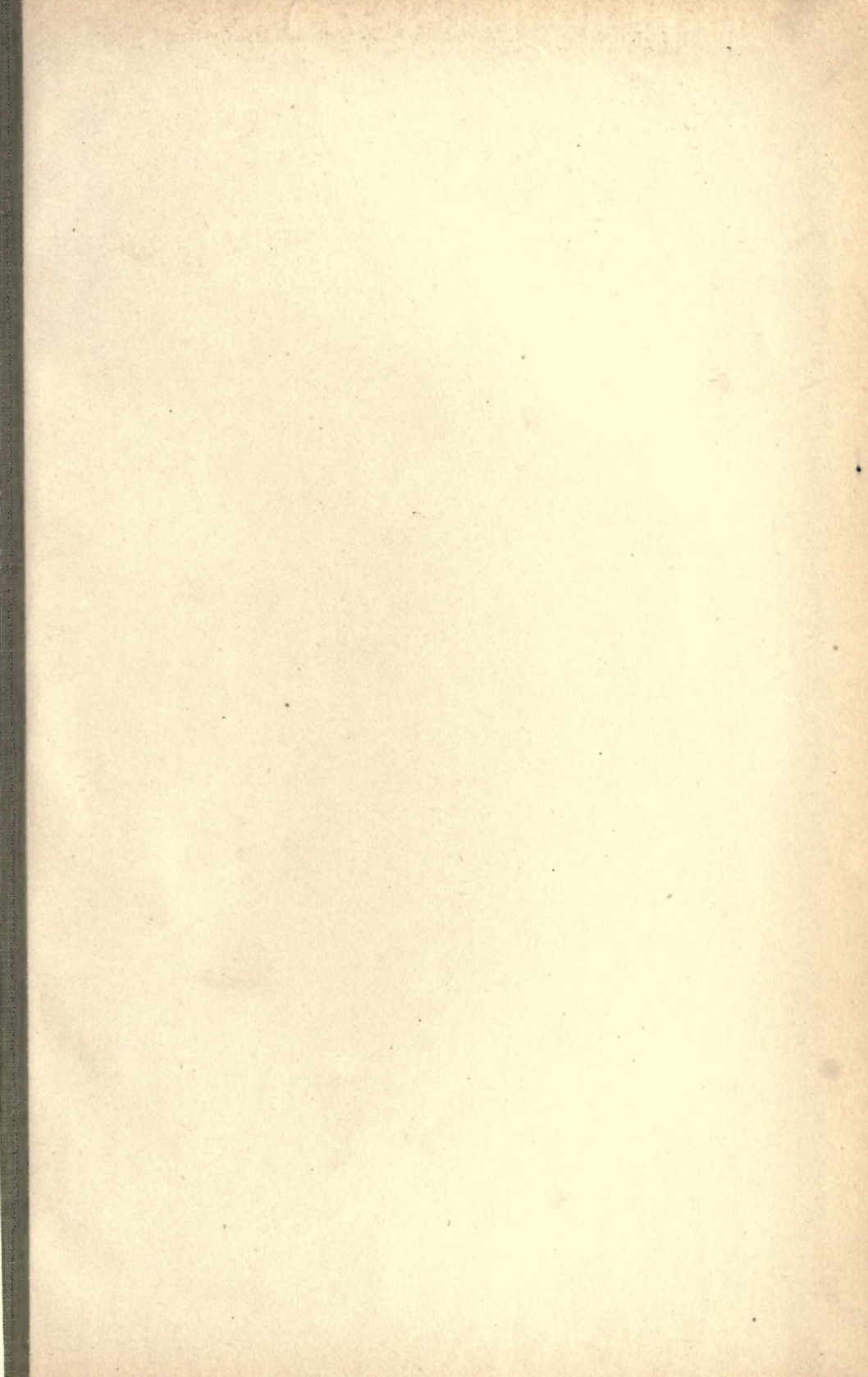
" 7. Diagram of calyx of *Pisocrinus* (after Bather).

" 8. Diagram of calyx of *Haplocrinus* (after Bather).

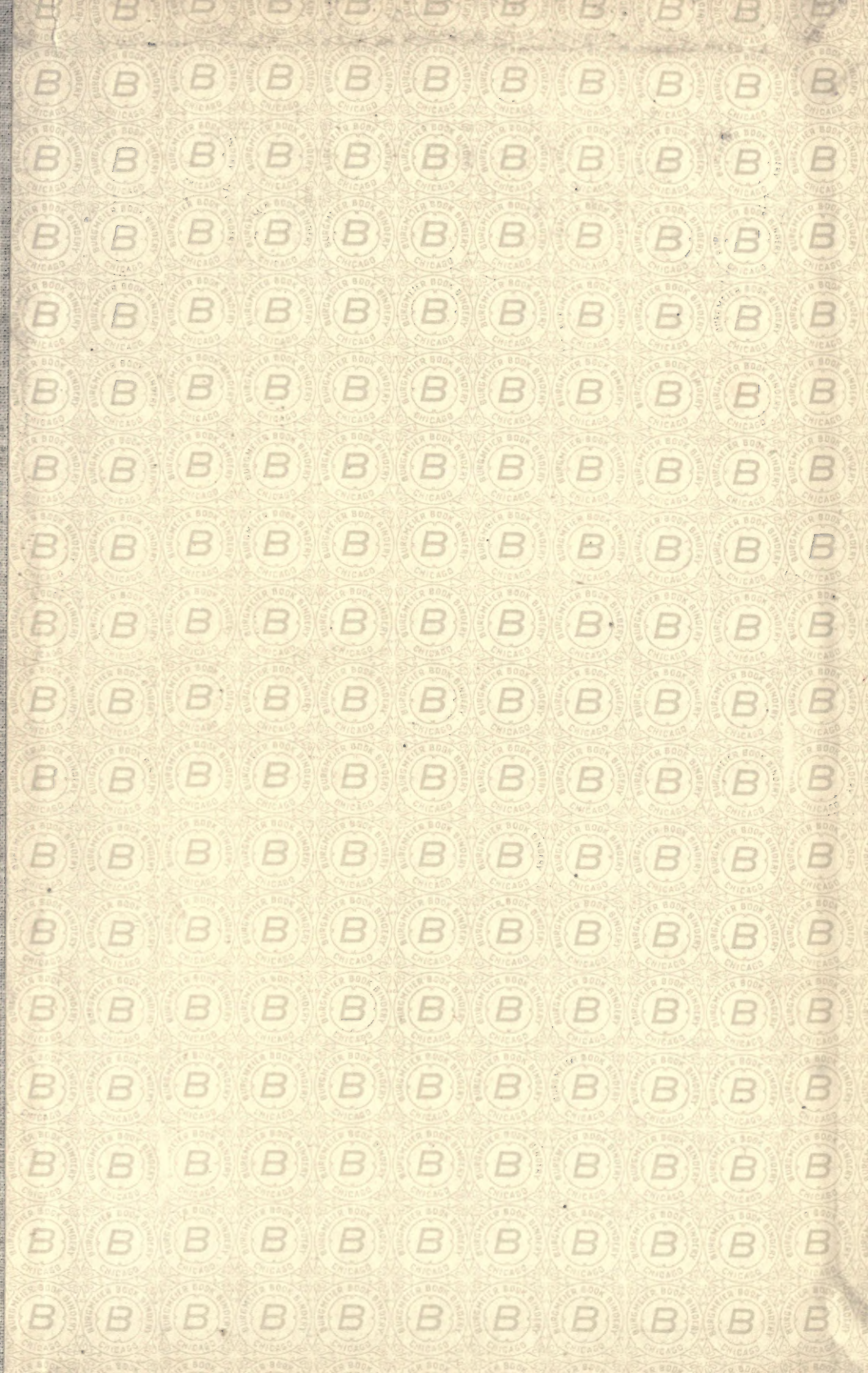
(Explanation of lettering on figures: RA=radial: Rs=super-radial; Ri=infer-radial: PB=posterior basal: X=anal plate.)











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